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DOD ACQUISITION

Case Study of the Air Force Advanced Warning System



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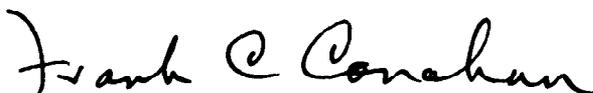
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Preface

The Chairmen of the Senate Committee on Governmental Affairs and its Subcommittee on Oversight of Government Management asked GAO to examine the capabilities of the program manager and contracting officer in weapon systems acquisition. As part of this study, GAO examined 17 new major weapon system programs in their initial stages of development. These case studies document the history of the programs and are being made available for informational purposes.

This study of the Air Force Advanced Warning System focuses on the role of the program manager and contracting officer in developing the acquisition strategy. Conclusions and recommendations can be found in our overall report, DOD Acquisition: Strengthening Capabilities of Key Personnel in Systems Acquisition (GAO/NSIAD-86-45, May 12, 1986).



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Advanced Warning System

Origin of the Program

The Advanced Warning System (AWS), terminated in March 1984, was an Air Force technology program initiated to develop the critical infrared technologies required for a follow-on space based missile warning system. The AWS Program consisted of several distinct but related efforts:

- an advanced technology effort for missile surveillance,
- a joint technology demonstration program involving the Air Force and the Defense Advanced Research Projects Agency (DARPA), and
- a developmental program emphasizing survivability.

To accomplish this, the program office planned to perform system concept studies supporting a decision on the development of an operational system.

Advanced Technology Effort

In 1974, the Air Force initiated the Missile Surveillance Technology Program to develop the technology for future missile surveillance requirements. The leading candidate to replace the existing missile surveillance system involved a revolutionary type of technology being developed under the Mosaic Sensor Program. The Mosaic Sensor Program, a project within the Missile Surveillance Technology Program, was established to develop and demonstrate the specific technologies required for a follow-on system. The Congress cancelled the Mosaic Sensor Program in 1979 and replaced it with the AWS Program.

A 1979 Defense Systems Acquisition Review Council (DSARC) reviewed the AWS concept. The function of the DSARC, meeting under the Secretary of Defense, was to weigh the alternatives for addressing the missile surveillance function and decide whether the available technological development (as developed under the Mosaic Sensor Program) was sufficiently mature to enter the demonstration and validation phase of the acquisition process. The DSARC was also to decide whether to upgrade the technology used on the existing system, or whether to develop an operational, advanced technology (mosaic sensor) system.

The DSARC met on December 20, 1979, and decided to upgrade the existing system with additional survivability improvements, explaining that the advanced technology was not sufficiently mature to make it operational at that time. The DSARC supported a congressional decision to terminate the Mosaic Sensor Program, but recommended that the Air Force and DARPA establish a joint technology development program (AWS)

to develop relevant infrared technologies to support a scheduled DSARC review in the mid-1980's for a follow-on missile surveillance system.

The Air Force and DARPA established an AWS joint program that was approved by the Air Force in September 1980, and formally approved by the Air Force and DARPA in June 1981. Subsequent to this approval, Air Force Space Division was appointed the lead agency to conduct a critical technology effort on mosaic arrays. While early Air Force AWS technology work was conducted under its missile surveillance program office, Space Division separated the AWS program from the missile surveillance program office in May 1981 and established an AWS office under the Deputy for Technology Directorate of Advanced Space Development.

By the end of fiscal year 1981, Space Division had identified AWS funding requirements totaling \$43.5 million for fiscal year 1982 and \$58.2 million for fiscal year 1983, but the Office of the Secretary of Defense (OSD) had approved only \$12.4 million for fiscal year 1982 and \$11.5 million for fiscal year 1983. To absorb these budget reductions, the program office reduced the technology effort. As a result, the ground demonstration originally planned for fiscal year 1984 would be unlikely to occur before fiscal year 1986. Therefore, the information needed to make a decision as to whether to proceed into development of a follow-on missile surveillance system would not have been available for the scheduled fiscal year 1985 DSARC review.

The program office did not receive the \$12.4 million approved by OSD for fiscal year 1982. Congress appropriated \$9.962 million for the fiscal year. After an initial delay in releasing the funds to the program due to a misunderstanding between the air staff and OSD over the requirements for the AWS program, the Air Force allocated \$7.962 million to the AWS program. Two million dollars of the congressional appropriation was reprogrammed to other Air Force programs with a higher priority. The \$7.962 million that the program received represented 80 percent of the fiscal year 1982 congressional appropriation, 64 percent of the OSD approved funds, and 18 percent of what Space Division had identified requirements for in fiscal year 1982.

In addition to funding changes, the responsibility for the management of the program also changed. A special joint program office composed of representatives from the Deputy for Technology and Deputy for the existing missile surveillance program was formed at Space Division in

early 1982 in order to prepare briefings for the Office of the Undersecretary of Defense (Research and Engineering). A February 10, 1982, memorandum of agreement between the Deputy for Technology and the Deputy of the missile surveillance system defined the role and responsibility each program office would have in regard to AWS. The memorandum in effect transferred AWS responsibility back to the missile surveillance program office to perform system concept studies and delegated technology work to the technology program office. Funding resources, however, were inadequate to perform both system concept studies and technological development and technological development suffered as a result.

The AWS program continued to experience funding instability. Fiscal year 1983 technology and system funding were curtailed, which delayed technological development. The Air Force budget projection in the Program Objectives Memorandum submitted in the spring of 1982 had eliminated funding for the program element for fiscal year 1984 and subsequent years. The Office of the Undersecretary of Defense (Research and Engineering) wished to restore the funding to the program through a favorable decision of the Defense Resources Board, which met in July 1982. After being briefed by Space Division, the Office of the Undersecretary of Defense (Research and Engineering) wrote a decision paper for the Defense Resources Board justifying the restoration of funding and on July 13, 1982, the Defense Resources Board reported that the funding would be restored.

After funds were restored, funds were budgeted to carry the program into production. In a Program Decision Memorandum (reply to the Air Staff's Program Objectives Memorandum), OSD said that the projected budget for AWS research and development would be \$20.8 million in fiscal year 1983, \$49 million in fiscal year 1984, \$80 million in fiscal year 1985, \$95 million in fiscal year 1986, and \$15 million in fiscal year 1987. If the system successfully passed a DSARC II in 1985 or 1986, the development phase of the program would end in fiscal year 1987 and the production phase would begin. Production funds of \$125 million in fiscal year 1987 and \$250 million in fiscal year 1988 were budgeted. Upon reaching the production phase, the program would cease to be a technology program and would be managed by a systems program office.

Developmental Program
Effort

The AWS program did not develop as originally planned; a shift in emphasis redirected the program from a technological program to a developmental program. While the AWS program was originally established as a joint technology program to develop infrared technologies, national strategic policy increasingly emphasized survivability of strategic systems through all levels of conflict. Given a limited amount of resources, this emphasis on survivability shifted funding away from AWS technology development to survivability enhancement.

A RAND study also dealt a setback to technology development while emphasizing survivability. With the emphasis on technology development to improve accuracy and performance, there were no system concept studies to assess the system as a whole, and Rand was awarded a contract for this purpose. The Rand report concluded that survivability of the system rather than increased accuracy and performance should be emphasized.

Status reviews in June and November 1982 also resulted in a change of emphasis in the program. These reviews were conducted by officials from the Space Division technology program office, the current missile surveillance program office, and DOD. The outcome was (1) formation of an ad hoc committee (United States Air Force Scientific Advisory Board) to assess approaches to space-based missile warning systems, (2) an informal decision to change direction from technology development to system concept studies, and (3) transfer of the program from the technology system program office to the current missile surveillance system program office.

The Air Force Scientific Advisory Board ad hoc committee to assess approaches to space-based missile warning systems met in February 1983. The committee's report stressed survivability options and concluded that current "state of the production art does not support a fiscal year 1985 start on a starring mosaic array sensor system requiring several million detector elements." The report also concluded that a fiscal year 1987 start "is possible provided \$50 million to \$100 million dollars of funding is provided to bring the production state of the art to the point where large detector arrays can be reliably and economically fabricated."

The AWS emphasis on performance enhancement was being dealt a severe setback on the basis of affordability, the state of the technology, and lack of user interest on one hand, and a change of national strategic

policy emphasizing survivability on the other. After issuance of the Scientific Advisory Board report in April 1983, a re-direction of the program took place at Space Division. A draft Program Management Directive, dated April 29, 1983, directed the start of "system studies to define alternate concepts for an advanced missile warning system with particular emphasis on survivability." As a result, the program office began work on the development of the AWS concept definition acquisition strategy and request for proposal.

Program Manager's and Contracting Officer's Background

When the AWS program was transferred to the missile surveillance system program office in early 1982, the program manager for the existing system, an Air Force colonel, also became program manager for the AWS. He retired in 1983 and the new program manager was also responsible for both the AWS and the missile surveillance program.

The second program manager delegated his authority to the deputy program manager, who developed the acquisition strategy and request for proposal. The program manager acted in a review and approval role, while his deputy handled the day-to-day operations of the program and had the lead role.

The second program manager, an Air Force colonel, has a bachelor's degree and a master's degree in electrical engineering. He also completed Air Command and Staff College and the Defense Systems Management College. The deputy program manager, also an Air Force colonel, has a bachelor's degree in aeronautical engineering and a master's degree in business administration. He also completed the Defense Systems Management College.

The program office contracting function was headed by a division chief who had other responsibilities in addition to AWS. The division chief was a GM-14 with a doctorate degree. The AWS contracting officer, who reported to the division chief, was an Air Force major with four years of contracting experience.

Development of the Acquisition Strategy

The acquisition strategy was developed in a corporate fashion. The contracting officer and the procurement staff developed a baseline strategy which was presented to the program manager. Changes were made until a consensus was reached at the program office level, with the Business Strategy Panels, and at a meeting of the Space Division program managers.

The acquisition strategy was to proceed in three phases. Multiple awards on the basis of conventional competitive source selection were planned for the Phase I concept development effort. In Phase I, in response to a request for proposal that was scheduled to be issued in November 1983, three contractors were to be chosen to perform the system concept studies. These three would compete until after the scheduled 1985 DSARC.

The Phase II effort would consist of full-scale engineering development of one of the three concepts or a possible synthesis of the concepts developed under Phase I. Phase II would be competed only among the Phase I participants and could result in multiple contract awards. Phase III would be awarded to a Phase II contractor for acquisition of long-lead materials and production of the satellite system.

Originally, two contractors would have competed in Phase II. Budgetary constraints, however, at the time of the Solicitation Review Panel for the Phase I concept definition request for proposal limited this option, as the money needed for competition had been deleted in the Air Force 1986 Program Objective Memorandum cycle. Although the program office was still planning on competing Phase II, it did not have the funding programmed to do so.

The objective of the Phase I approach was to enhance competition and to allow for a flexible strategy of options to present to the DSARC. The program office could present to DSARC either one of the three system concept proposals or a synthesized version of all three. The program office would be prepared to have a number of well-defined follow up concepts to support a DSARC decision so the program office would not be directed, as in 1979, to perform additional studies.

The request for proposal was developed as a team effort by the program office and the contracting function. The statement of work and specifications were developed by the program office and reviewed by the contracting officer. The business terms and conditions were established by the contracting officer, reviewed by the program manager, and reviewed and critiqued by the Solicitation Review Board. The evaluation criteria were jointly developed by the program office and the contracting officer. The AWS program manager and contracting officer reviewed the request for proposal to determine its consistency with the acquisition strategy. The deputy program manager and the Solicitation Review Panel recommended changes which were being incorporated into the

final version of the request for proposal when the program was cancelled.

The development of the source selection plan was a joint effort. The contracting officer was involved in the initial phase of the preparation of the source selection plan. The deputy program manager reviewed all the documents and worked with the contracting officer and engineers in the plan's development.

Impact of the Strategic Defense Initiative

A change of emphasis in national policy shifted the direction of the AWS program. On March 23, 1983, President Reagan delivered a speech in which he called for a "long-term research and development program to begin to achieve our ultimate goal of eliminating the threat posed by strategic nuclear missiles." Subsequently, the Defensive Technology Study Team and the Future Strategic Strategy Study Team were established to assess the technical and policy issues of a ballistic missile defense system. In January 1984, the Strategic Defense Initiative Research Program was established.

The coming of the Strategic Defense Initiative (SDI) cast uncertainty on the future of the AWS program. The AWS request for proposal for concept definition was scheduled for release in November 1983 after top Air Force management approval was obtained. Its approval was held up at the Office of the Assistant Secretary of the Air Force for strategic systems out of concern for the relationship of the program to the Strategic Defense Initiative.

Attempts were made to reconcile the acquisition of the AWS with the thrust and objectives of the SDI. In the final stages of trying to release the AWS request for proposal, there was an effort to write the requirements in such a way as to favor a satellite using advanced technology. The technology for this type of satellite, however, was not available due to the reduction of the AWS technology effort that occurred prior to the SDI. The result of the attempt to rescope the AWS effort was considered a marginal response to the SDI Surveillance, Acquisition, Track and Kill Assessment program element objectives by the Air Force's Office of the Assistant Secretary. On March 28, 1984, the Deputy for Strategic Systems denied approval for release of the request for proposals because

"the primary consideration in deferring these acquisition initiatives at this time is the budgetary environment facing the Air Force for the next several years. There are other issues of concern, however, affordability is clearly the dominant factor."

Evaluation of Roles and Acquisition Strategy

Roles and Responsibilities

The program manager had a review and approval role in the development of the acquisition strategy. The program manager delegated his authority to his deputy who had a lead role in the development of the strategy. The contracts manager and the contracting officer were actively involved and acted as influential advisors. The strategy was acceptable to top management up until the program's cancellation due to resource constraints and other concerns.

Design Competition

DOD policy encourages competitive design up to full-scale development or beyond if cost effective. Air Force Systems Command's policy is to compete programs up to critical design review (an advanced stage of full-scale development) and, preferably, through full-scale development.

The original acquisition strategy was consistent with this policy. The Air Force planned to have two contractors compete through the critical design review. Funding, however, was adequate to carry competition only through concept definition as Air Force budgetary constraints eliminated the funding for further competition during the 1986 budget cycle.

The Production Competition

The Air Force planned to acquire a limited number of AWS satellites; therefore competition was not planned for the production phase of the program.

External Factors

The AWS program was affected by external factors. The program manager's request for funds to carry competition up to critical design review was reduced during the budgetary review process, and competition would likely have been stopped at the end of the concept definition.

Furthermore, funding difficulties resulted in curtailment of the mosaic sensor technology development effort before it proceeded far enough to develop a small scale model. As a result, alternative design solutions would not have been available for the planned follow-on system competition.

Present Status

The AWS program was deferred in March 1984, due to affordability and other concerns

Chronology of Events

December 1979	DSARC for follow on missile surveillance satellite held Mosaic Sensor Program cancelled.
May 1981	Space Division AWS office established under the Deputy for Technology.
June 1981	DARPA/Air Force AWS joint program approved.
February 1982	AWS transferred to the missile surveillance systems program office.
June 1982	AWS status review held.
November 1982	AWS status review held.
March 1983	President announces strategic defense initiative.
April 1983	Scientific Advisory Board report issued. Draft Program Management Directive directs start of AWS systems studies.
November 1983	AWS request for proposal scheduled for release.
January 1984	Strategic Defense Initiative Program established.
March 1984	AWS program deferred.

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